

## CLAIMS

What is claimed is:

1. An optical coupling apparatus for optically coupling a first, rotationally  
5 moveable optical component with a second, non-rotating optical component to  
enable an optical signal to be transmitted between said first and second optical  
components, said apparatus comprising:  
a first annular member for supporting an outer most end of said first optical  
component in at least a partial circular arrangement;  
10 a second annular member for supporting an outer most end of said second  
optical component in at least a partial circular arrangement, said first and second  
annular members being longitudinally aligned with one another along a  
longitudinal axis; and  
wherein a face portion of each of said annular members are placed in  
15 facing relationship to enable said first, rotationally moveable optical component to  
be optically coupled to said second non-rotating optical component without  
physical contact therebetween.
2. The apparatus of claim 1, wherein said first annular member includes  
20 an annular channel formed therein for supporting an outermost end of said first  
optical component in at least a partial circular arrangement.
3. The apparatus of claim 1, wherein said second annular member  
includes an annular channel formed therein for supporting an outer most end of  
25 said second optical component in at least a partial circular arrangement.
4. The apparatus of claim 1, further comprising a bushing adapted to  
extend within both of said annular members to maintain said annular members in  
longitudinal alignment along said longitudinal axis.  
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5. The apparatus of claim 1, further comprising a motor having an output  
shaft, said output shaft extending along said longitudinal axis through each of  
said annular members and being fixedly coupled to said first, rotationally

moveable optical component for rotating said first, rotationally moveable optical component.

6. An optical coupling apparatus for optically coupling a first, non-rotating optical component with a second, rotating optical component, comprising:

5 a first annular member for supporting an output end of said first optical component in at least a partial circular pattern, said first annular member receiving an input optical signal from said first optical component;

10 a second annular member for supporting an input end of said second optical component in at least a partial circular pattern, said second annular member being disposed along said longitudinal axis and adjacent said first annular member and being rotatable about said longitudinal axis;

a motor having an output shaft operatively coupled to said first annular member for rotating said first annular member relative to said second annular member; and

15 wherein said first and second annular members cooperatively couple said input signal from said first optical component to said second optical component.

20 7. The apparatus of claim 6, further comprising a shaft for extending partially within each of said annular members for assisting in maintaining alignment of said annular members along said longitudinal axis.

8. The apparatus of claim 6, wherein each of said annular members has a face portion that faces the other.

25 9. The apparatus of claim 8, further comprising a circular seal circumscribing said face portions.

10. The apparatus of claim 6, wherein said first annular member comprises:

30 an annular slot formed therein;  
wherein said annular slot opens into a notched area extending circumferentially around an outer surface of the first annular member; and

wherein said output end of said first optical component extends through said notched area into said annular slot such that an outermost end of said input end is disposed parallel to said longitudinal axis.

5            11. The apparatus of claim 8, wherein said second annular member comprises:

an annular slot formed therein;

wherein said annular slot opens into a notched area extending circumferentially around an outer surface of the second annular member; and

10           wherein said input end of said second optical component extends through said notched area into said annular slot such that an outermost end of said input end is disposed parallel to said longitudinal axis.

12. An optical coupling apparatus for optically coupling a first, rotationally moveable optical fiber bundle with a second, non-rotating optical fiber bundle, comprising:

5           a first annular member for supporting an outermost end of said first optical fiber bundle in a circular pattern, said first annular member being rotatable about a longitudinal axis; and

          a second annular member for supporting an outermost end of said second optical fiber bundle in a circular pattern, said second annular member being  
10       disposed along said longitudinal axis and adjacent said first annular member, but spaced from said first annular member such that no physical contact occurs between said outermost ends of said fiber optic bundles.

13. The apparatus of claim 12, further comprising a motor having an  
15       output shaft operatively coupled to one of said first and second annular members for rotating said one of said annular members relative to the other.

14. The apparatus of claim 12, wherein said first annular member comprises:

20           an annular body having an annular slot formed therein, said annular slot opening onto a face portion of said annular body;

          a notch formed on an outer surface of said annular body and in communication with said annular slot; and

          wherein said outermost end of said first optical fiber bundle extends  
25       through said notch and said annular slot such that said outermost end of said first optical fiber bundle is exposed on said face portion.

15. The apparatus of claim 12, wherein said second annular member comprises:

30           an annular body having an annular slot formed therein, said annular slot opening onto a face portion of said annular body;

          a notch formed on an outer surface of said annular body and in communication with said annular slot; and

wherein said outermost end of said second optical fiber bundle extends through said notch and said annular slot such that said outermost end of said second optical fiber bundle is exposed on said face portion.

16. The apparatus of claim 12, further comprising a shaft adapted to extend partially within each of said annular members for maintaining longitudinal  
5 alignment of said annular members.

17. A method for optically coupling signals from a first optical fiber bundle into a second optical fiber bundle, comprising:

5 arranging an outermost end of said first optical bundle in at least a partial circular path about a longitudinal axis;

arranging an outermost end of said second optical bundle in at least a partial circular path about said longitudinal axis;

10 disposing said optical bundles such that said outermost ends are spaced adjacent one another along said longitudinal axis but not in physical contact;

supplying an optical input signal to one of said optical fiber bundles; and  
coupling optical signals from said one of said optical fiber bundles into the other.

18. The method of claim 17, further comprising:  
15 rotating one of said optical fiber bundles about said longitudinal axis while said optical fiber bundles are optically coupled.

19. The method of claim 17, further comprising:  
20 using an annular member to support said outermost end of said first optical fiber bundle.

20. The method of claim 17, further comprising:  
using an annular member to support said outermost end of said second optical fiber bundle.

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